

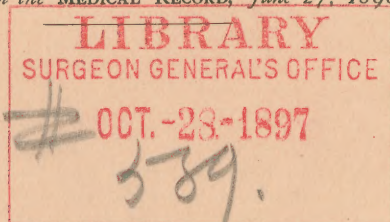
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The State of the Gastric Mucosa
in Secretory Disorders of
the Stomach.

BY
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NEW YORK.

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589.THE STATE OF THE GASTRIC MUCOSA IN
SECRETORY DISORDERS OF THE STOM-
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BY MAX EINHORN, M.D.,

NEW YORK.

You all know the great strides which have of late years been made in the study of diseases of the stomach. The chief progress lies in our ability to examine the different functions of the organ, but principally that of secretion. In this latter function many deviations from the normal condition are found, and indeed these constitute the ailments of the greater number of patients with chronic digestive disturbances.

Must there always be a manifest anatomical lesion for such gastric disorders, or can they be caused and entertained by some purely nervous influences? This question has been and is still studied by the foremost clinicians of this country and Europe, and a positive answer cannot as yet be given. Leube and Ewald on the other side of the ocean and in this country Dr. Charles G. Stockton, of your city, have laid much stress upon the neurotic character of these secretory disorders. Dr. Stockton even showed that some functional gastric anomalies are occasionally of reflex origin. Hayem,² however, is of the opinion that the secretory anomalies are due to anatomical changes in the gastric tubuli, which view is also held by Boas and others.

The minute anatomical condition of the stomach can seldom be studied in autopsies, as soon after death and sometimes even during the agony the glandular layer is subject to manifold artificial changes, which more or less mar the true picture. For this reason efforts have been made to study the pathology of the stomach by means of small pieces of mucosa excised while performing major operations on the stomach (Korczynski and others). Boas, appreciating the importance of such examinations, was the first to investigate with the microscope pieces of gastric mucosa found occasionally in the wash water of the stomach after using lavage, and Cohnheim³ has recently published

¹ Read before the Alumni Association of the University of Buffalo, at the fiftieth anniversary, Tuesday, May 5, 1896.

² Gazette Hebdomadaire, 1892, Nos. 33 and 34.

³ P. Cohnheim: Archiv für Verdauungskrankheiten, Bd. i., Heft 3, p. 274.

an extensive paper comprising his own and Boas' experience on this subject.

During the last three years I had the opportunity of examining small pieces of gastric mucosa from thirty-two patients. From several of them pieces of gastric mucosa were obtained at different periods of time, and in this way the examination could be repeated and the result compared with the first examination. It appeared to me of interest to compare the results of the microscopical examinations of the specimens found in these patients with the condition of the gastric secretion manifested by them. This may perhaps give us a clew as to the question above ventilated, namely, whether the secretory anomalies are dependent upon anatomical changes. But before analyzing my cases permit me to say a few words with regard to the occurrence of these pieces of gastric mucosa and to their examination.

In washing out the stomach (especially in the fasting condition) occasionally a small piece of gastric mucosa may be found in the wash water. Such a piece may also be found occasionally in the gastric contents, when examining the patient after a test breakfast or test dinner. I have also observed that in some cases the occurrence of small pieces of gastric mucosa in the wash water is a constant phenomenon (erosions of the stomach). The number of these pieces varies from one to four. Such a piece looks quite red. The thickness may vary from one-half to one millimetre, while the size may vary from that of a large pin's head to that of a small bean. Sometimes they are found embedded in mucus. While the presence of glands in these small pieces may be found by examining them in the fresh condition under the microscope, a thorough examination can be made only after a sufficient preparation of these particles (hardening in alcohol, embedding in celloidin, and staining with eosin-hæmatoxylin, picro-carmin, methylene blue, and thionin).

In examining the microscopical picture of the different specimens the following groups can easily be distinguished:¹

1. N.—Normal: Glands and interglandular tissue exist in normal proportions.

¹ The illustrations have been taken from my book, "Diseases of the Stomach" (Wm. Wood & Co.), now in press.

2. C.—Connective tissue: While there is a normal proportion between glands and interglandular tissue, there is a marked proliferation of connective tissue around the glands.

3. P.—Proliferation: There is a marked proliferation of glands; they are nearer each other, and sometimes have an elongated and curved shape.

4. B.—Beginning atrophy: The glands exist in smaller numbers and are sometimes also smaller in size, the interglandular spaces being quite large and filled partly with small-cell infiltration, partly with connective-tissue formation.

5. A.—Atrophy: Complete atrophy; no glands visible; only indications of their previous existence; round-cell infiltration.

6. V.—Vacuolization: Within the glands exist vacuoles of different shape, being the result of a mucoid degeneration of some glandular cells.

Sometimes one specimen shows characteristics belonging to two of the groups mentioned.

In the following table is found a list of all the cases examined, stating diagnosis, the condition of the gastric secretory function, and the pathological structure as found in these pieces of mucosa under the microscope and characterized by the above-mentioned initials. Whenever one specimen belonged to two different groups, it was signified by the two corresponding initials, the first marking the principal feature of the specimen. In going over the table it will be advisable first to consider each secretory group apart.

There were four cases of *euchlorhydria* (or normal gastric juice). The anatomical state presented quite varied pictures: proliferation of glands with connective-tissue formation, beginning atrophy, and slight vacuolization.

One patient (R. H.), from whom pieces of gastric mucosa were obtained on three different days, presented varied pictures on each occasion.

Twelve cases of *hyperchlorhydria* showed proliferation of glands in six, while in the remaining six the gastric mucosa presented either a normal appearance or slight connective-tissue formation around the glands; only twice was slight vacuolization visible, and once atrophy of glands with connective-tissue formation.

Nine cases with *hypochlorhydria* presented a

TABLE OF CASES IN WHICH SMALL PIECES OF GASTRIC MUCOSA HAVE BEEN EXAMINED.

	Name.	Diagnosis.	Gastric Secretory Function.	Anatomical State.	Remarks.
I.	1. R. H., Nov. 26, '94 ..	Erosions of the stomach	Euchlorhydria.	P. C.	
	2. do. Dec. 12, '94 ..	do.	do.	A.	
	3. do. Jan. 11, '95 ..	do.	do.	C.	
	4. E. D.	Neurasthenia gastrica	do.	B.	Glands small; round-cell infiltration.
	5. B. E.	Carcinoma cordiae	do.	B.	
	6. Gustav D.	Erosions of the stomach; gastritis glandularis chronica mucosa.	do.	N. V.	Vacuolization only slightly marked.
II.	7. Mrs. K. A., Jan. 9, '95 ..	Erosions of the stomach	Hyperchlorhydria.	C.	
	8. do. Jan. 15, '95 ..	do.	do.	P.	
	9. Ernst T.	Atonia ventriculi	do.	N.	
	10. Mrs. J. H. W.	Gastro-succorrhoea continua peridica.	do.	C.	Glands near each other.
	11. Dr. B.	Hyperchlorhydria	do.	N.	
	12. Theodore S.	do.	do.	P.	
	13. Timothy M.	do.	do.	P.	Proliferation slightly marked.
	14. S. W.	Erosions of the stomach	do.	P.	
	15. Edgar H.	Gastro-succorrhoea continua chronica.	do.	P. V.	Vacuolization only slightly marked.
	16. M. Z.	Hyperchlorhydria	do.	N. C.	Glands small, slightly constricted.
	17. Mrs. L. S.	Enteroptosis	do.	C. V.	Vacuolization only in traces.
	18. Adolph L.	Ulcus ventriculi	do.	A.	Connective-tissue proliferation.
	19. H. C.	Neurasthenia gastrica	do.	P.	Glands small.

20. Henry R. A.	Gastritis glandularis chronica.	Hypochlorhydria, do. do. do. do. do. do. do. do. do.	A.	Only traces of glands visible. Glands not distinct and small, vacuolization only slightly marked.
21. Mrs. S.	Ischochymia, stenosis pylori.		B. V.	
22. Mrs. J. S. H., Nov. 4, '95.	Gastritis glandularis chronica.		N.	
23. do. Feb. 11, '96.	do.		N.	
24. Morris H.	Vitium cordis; gastritis glandularis chronica.		C.	
25. Mrs. B.	Gastritis glandularis chronica.		N. C.	
26. Morris J., June 29, '94.	Erosions of the stomach; gastritis glandularis chronica.		A.	
27. do. Jan. 10, '95.	do.		P.	
28. Jacob K.	Gastritis glandularis chronica.		B.	
29. H. M.	Erosions of the stomach; gastritis glandularis chronica.		V.	
30. J. McG.	Ulcus ventriculi.	P.	Beginning vacuolization. Glands enlarged.	
31. Miss Lina S.	Enteroptosis; achylia gastrica.	Achlorhydria.	N. B.	Glands small; peptic cells visible and karyokinesis. Glands enlarged.
32. M. G.	Erosions of the stomach; achylia gastrica.	do.	N.	Glands appeared swollen.
33. S. F.	Tuberculosis pulmonum; achylia gastrica.	do.	P.	
34. G. J.	Carcinoma pylori.	do.	V.	Round-cell proliferation.
35. B. T.	Carcinoma ventriculi.	do.	A.	
36. David S.	Achylia gastrica.	do.	A.	
37. R. H. A.	do.	do.	A.	

normal condition of the glands in three, atrophy in two, beginning atrophy in two, connective-tissue proliferation in one, and proliferation of glands in one. Of these nine cases two were examined on two different occasions; in one the microscopical pictures were pretty much alike, while in the other once atrophy and the second time proliferation of glands were found.

Seven cases of achlorhydria (principally achylia gastrica) showed a normal condition twice, complete atrophy three times, while once there was very marked vacuolization and once slight proliferation of glands.

In none of the four different secretory conditions was there found a perfect harmony in the microscopical picture of the gastric mucosa. It, therefore, does not appear justifiable to make a positive diagnosis as to the existing disease from the examination of such small pieces of gastric mucosa.

Two facts, however, are quite apparent: proliferation of glands is frequently met with in hyperchlorhydria (in half the number of cases) and atrophy is encountered in the same proportion in achylia gastrica.

If we now return to our first question, whether anomalies of the gastric secretory function are dependent upon anatomical lesions, it seems that the results of the table speak against this assumption. For if anatomical changes are the primary factors, there ought to be more constancy in the results of these microscopical examinations.

The table, however, shows that there is some connection between hyperchlorhydria and proliferation of glands on the one hand, and between achylia and atrophy of the glandular elements on the other hand. How are we to explain these anatomical changes if we do not deem them the principal factors in these conditions?

Before answering this question I would like to remind you of Edinger's¹ excellent paper: "A new theory of the causes of some nervous diseases, especially of neuritis and tabes," in which he explains the anatomical changes found in the nerves and the spine by a disproportion between the functional activity and the replacement of these elements. You all know that normally the increased activity of an organ leads to

¹ Edinger: Volkmann's "Sammlung klinischer Vorträge," 1894, No. 106.

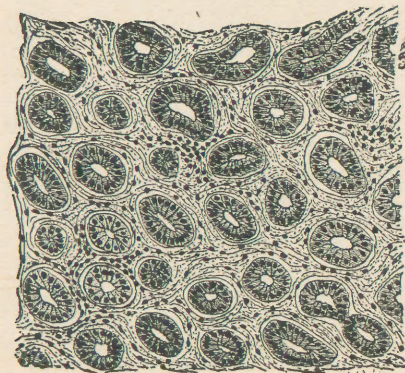


FIG. 1.—A small piece of gastric mucosa (from patient, Mrs. H.) presenting a cross-section of the glands in normal appearance. $\times 80$.

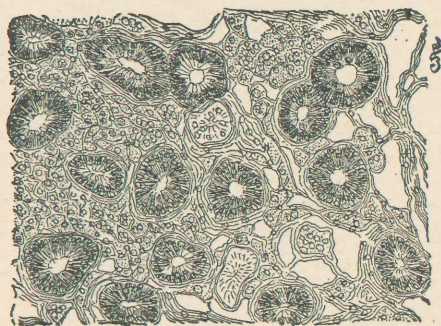


FIG. 2.—A piece of gastric mucosa (from patient, Mrs. R. S.) showing beginning atrophy of glands (small pale areas within the glands) and connective-tissue proliferation. $\times 120$.

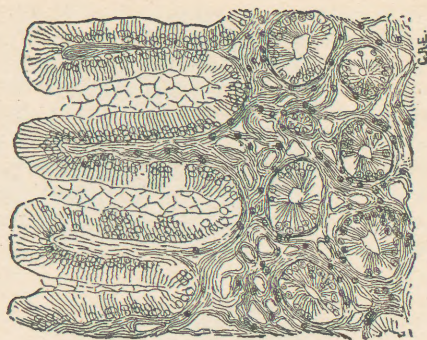


FIG. 3.—A piece of gastric mucosa (from patient, H. R.) showing the mouths of glands; the pale spots show beginning atrophy of the glands; connective-tissue proliferation best shown in lower part of specimen. $\times 120$.

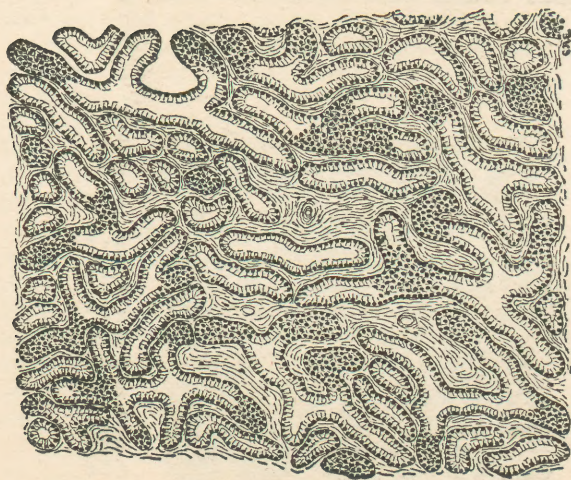


FIG. 4.—A piece of gastric mucosa (from patient, E. H.) showing proliferation of glands. $\times 80$.



FIG. 5.—A piece of gastric mucosa (from patient, B. E., with carcinoma cardiae) showing destruction of glands by connective-tissue proliferation. $\times 60$.

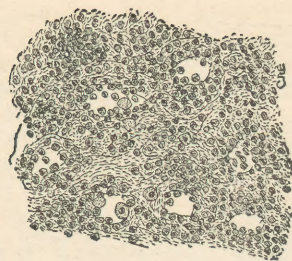


FIG. 6.—A piece of gastric mucosa (from patient, R. H.); no glands visible, only some emptiness spaces where glands had previously existed. $\times 80$.

the strengthening of the same; often also to a direct increase in volume. On the other hand, inactivity of an organ leads gradually to a weaker and atrophic state of it.

According to W. Roux² there exists the following law: "Increased activity heightens the specific force of the organs, while a diminished activity causes a weaker state of the organs." Each cell, according to this writer, has to gain a living by work, and the more it works the better nourished it is and the stronger it grows.

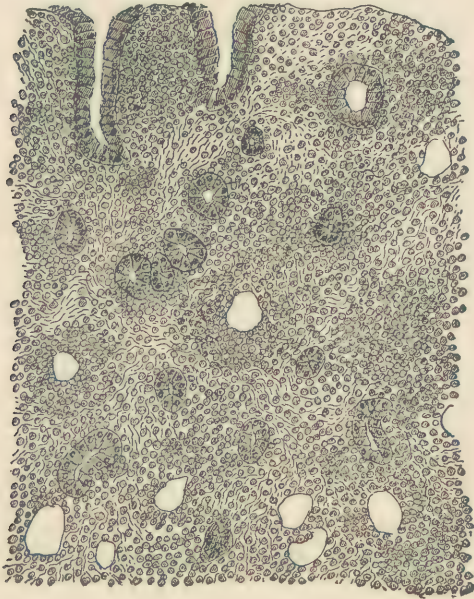


FIG. 7.—A small piece of gastric mucosa (from patient, D. S., with achylia gastrica) found in wash water from stomach; only few glands visible, empty spaces where glands had previously existed; general small-round-cell infiltration. $\times 80$.

Πόλεμος πατήρ πάντων—"Strife the cause of all"—Heraklitos once said, and the entire truth of this sentence has been appreciated since the work of the great Darwin and his followers (Haeckel, Roux, and others).

The facts just mentioned show the importance of the functional activity with regard to the state of an organ:

² W. Roux: "Entwicklungsmechanik der Organismen," 1895.

the elements which come more into play and do more work will gain supremacy, they will increase in strength and in numbers.

If now we return to the stomach there seems to be hardly any difficulty whatever in explaining why con-



FIG. 8.—A small piece of gastric mucosa (from patient, J., with carcinoma pylori) showing mucoid degeneration of the glands with vacuolization; some connective-tissue proliferation. $\times 140$.

ditions of hyperchlorhydria are frequently found associated with a proliferation of glands, while those of achylia occur with an atrophy of same. It would be contrary to the above-mentioned law if this were not the case.

It remains only to explain why the increased function of the glands does not always show hypertrophy of same, and, *vice versa*, their inactivity an atrophy. But this can be answered by assuming that the functional activity or inactivity has not lasted long enough to produce those changes over the entire organ.

The hypothesis which I have expounded before you is not merely of a theoretical nature, but seems to me to be of practical importance with regard to treatment. Referring the functional disorders of gastric secretion as due to direct anatomical changes (inflammatory processes of the organ), the treatment would have to look principally to according the organ more rest and to diminishing its work in every conceivable manner. If the above hypothesis be true, that the secretory disorders are primary, not dependent upon inflammatory processes, then the treatment will have to be directed toward improving the general (and also nerve) state of the system and also toward methodically strengthening the stomach in such a manner that the increased function shall be balanced by increased nutrition and replacement of waste.

To recapitulate, permit me to draw the following conclusions:

1. The microscopical examination of a small piece of gastric mucosa found in the wash water after using lavage does not permit a positive diagnosis.
2. Although we frequently meet with anatomical conditions of the gastric mucosa which correspond to functional disorders of secretion, this does not prove that these are due to the anatomical state. The latter, instead of being the cause, may be the effect.

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